HEALTH SYSTEMS RESEARCH AND INTERSECTORAL COLLABORATION IN VETERINARY PUBLIC HEALTH

Report of a WHO Consultation
held in Geneva from 4 to 8 December 1989

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Executive Summary

Health Systems Research (HSR) is the employment of relevant scientific disciplines, including social studies, to obtain information enabling selections between alternatives in structure, organization and function of human and animal health systems in order to optimize results at minimal cost.

Veterinary public health (VPH) deals with the contributions of veterinary medicine to public health including the zoonoses (diseases transmissible between man and animals), food hygiene, comparative medicine, and associated disciplines.

This report concentrates on HSR applied to selected major zoonoses problems, notably rabies, salmonellosis and brucellosis, with the focus on the intersectoral components of these diseases that may be crucial in determining the success or failure of control efforts for them.

Considerable knowledge exists with respect to technical and administrative requirements for their successful control, but despite this knowledge costly failures have been experienced in many countries, especially with regard to salmonellosis and brucellosis.

HSR analysis of rabies control in countries of varying economic development revealed critical intersectoral factors spelling success or failure in particular situations.

The report covers HSR of intersectoral components at the international, national, provincial and local community levels. It suggests pathways to apply HSR to the three zoonoses cited, and by extension to other areas of veterinary public health.

Finally, the report considers the education and training needs for veterinarians in HSR, with emphasis on management and epidemiology.

1. Introduction

A WHO consultative meeting on Health Systems Research (HSR) and Intersectoral Collaboration in Veterinary Public Health met in Geneva from 4-8 December 1989. The meeting was opened on behalf of the Director-General of the World Health Organization by Dr T. Bektimirov, Assistant Director-General.

Dr D. D. Joshi was elected Chairman, Professor G. Schwabe Vice-Chairman, and Dr M. Jegathesan and Dr G. Beran were appointed Rapporteurs. The participants are listed in Annex 1.

Dr Bektimirov noted that despite the efforts to provide technical and managerial guidelines and to train specialists, many programme areas are not developing satisfactorily, particularly in developing countries with limited resources. He pointed out that the annual cost of total rabies elimination in the dog population, for example, would be less than the expense currently borne for human postexposure treatment. This has been so for a number of years - but effective control of the disease in the dog population has not been brought about. Dr Bektimirov explained that such serious questions are the starting point for health systems research in veterinary public health which embraces the domestic animal or the complexity of wildlife and vector ecology on the one hand, the owner or those responsible for the environment on the other, and in addition the services and individuals trying to combat infection.
The HSR Programme within WHO was introduced in 1974 and has evolved continuously over the years. The General Programme of Work for 1990-1995 states that HSR is to be a continuing part of the managerial process for health development with findings to be used for policy making and planning.

The WHO Programme and Budget for 1990-1991, approved by the World Health Assembly, included "Consultation on health systems research and intersectoral collaboration in veterinary public health". The term "intersectoral" refers here to linkages between administrative and functional entities connected with health or veterinary services, e.g. ministries, diagnostic and production laboratories, international and local organizations (FAO, community groups), etc.

The present consultation was limited to HSR as applied mainly to the intersectoral component of selected problems in veterinary public health (VPH) as developed in WHO. VPH and HSR are broad fields covering many areas and disciplines, and in order to design such research with some expectation of concrete results, the field of zoonoses was selected as the major area for analysis. Moreover, since there exist more than 150 infections transmissible between man and lower animals, a further narrowing of objectives was in order. For this purpose, three important zoonoses - rabies, salmonellosis and brucellosis - were selected as examples to be dealt with.

2. Health Systems Research

2.1 Definition and Scope of Health Systems Research (HSR)

A generally accepted definition of HSR is that it constitutes the employment of relevant scientific disciplines, including social studies, to obtain information enabling selection between alternatives in structure, organization and function of human and animal health systems in order to optimize results at minimal cost.

HSR is action taken to obtain accurate information on what is actually happening in particular situations by observations on the spot ("in the field"). It assists managers to elucidate problems of coordination; improve the quality of services delivered; make optimal resource allocations; ensure an interdisciplinary approach; identify objectives, options available, constraints and appropriate measures; model simulations which can lead to conclusions when no clear mathematical formula can be applied; generate knowledge to improve the planning, organization and operation of the health system; and uncover ways in which the health system and community can together develop the capacity to solve the community's own problems.

Thus health systems research becomes a prerequisite and management tool for designing, executing and evaluating complex programmes involving interdisciplinary and intersectoral cooperation and the participation of the community.

By adjusting control measures to epidemiological, economic and social conditions, health systems research identifies resources and mechanisms for their mobilization. Specifically, it tries to predict, record, assess and overcome events and conditions inhibiting resource mobilization. These are often due to incomplete planning, changing epidemiological conditions, personal attitudes and reactions, management procedures and technical unpreparedness. Surprisingly, lack of funds is not the principal cause of programme failure in many situations.
2.2 The role of HSR in intersectoral collaboration

The principal question that arises can be stated as follows: are intersectoral components crucial or even important for the successful application of control measures for the zoonoses cited above? HSR seeks answers to this and related questions. It requires that the design of HSR be implemented within the resources of WHO and its Member States. This approach rests on fairly solid ground, at least as far as technical knowledge of these three selected diseases is concerned, and awareness of what is not known about them. One may thus be able to identify important gaps in information through HSR analysis and to recommend concrete action to fill these lacunae.

Discussions centred around how HSR and allied subjects, such as health behavioural and health economic research, can help answer the question of improving intrasectoral, intersectoral and interdisciplinary collaboration and coordination at all levels of the health care system from the community to the international levels. In the process, the group reviewed the technical and managerial aspects of the problem and how they are linked.

Solutions to these issues are usually unique to a particular country, or even a region within it, and accordingly research findings may not be easily extrapolated. This emphasises that HSR should be incorporated into the managerial process and used as a tool to increase its efficiency and effectiveness.

The way to demonstrate integration of HSR in the managerial process would be first of all to develop the capacity for HSR among the relevant sectors involved in the control of zoonoses and institutionalize it within their own systems, with the ultimate goal that it would be used routinely at all levels of management to provide information to support decision making. This should result in the formation of a critical mass of trained managers with an appropriate technical background. A way to achieve this would be to conduct courses and workshops for relevant personnel. To ensure that this is carried out in a practical manner, it would be necessary to establish a focal point in both the medical and veterinary public health sectors.

The applications of HSR involve the stages specified in Diagram 1.

Certain limitations of HSR must nevertheless be kept in mind. In its complexity, it may require a time-consuming and costly step-by-step development that may not be practicable for some countries. Therefore guidance is needed on simplified procedures which permit application of guidelines on zoonoses control, especially in the developing countries. Thus for the present, very provisional formulations may have to be used to meet the most pressing needs.

3. Veterinary Public Health (VPH) and HSR

3.1 Scope of VPH

The scope of VPH must be taken into account when concentrating on intersectoral components of HSR at all major interfaces of VPH and at different levels - international, national, provincial, district, and local (community).

The human health system is considered as the main frame, with the veterinary dimension being integrated in that frame. The principal functions of VPH concern the control and elimination of zoonoses in the first instance, plus the following areas of activity: food hygiene (production, processing and distribution of foods of animal
**Diagram 1**

**Steps in the Development of a Health Systems Research Proposal:**

<table>
<thead>
<tr>
<th>Questions you must ask</th>
<th>Steps you will take</th>
<th>Important elements of each step</th>
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<tbody>
<tr>
<td>What is the problem or what is to be studied?</td>
<td>statement of the problem</td>
<td>literature and other available information</td>
</tr>
<tr>
<td>What information is already available?</td>
<td>literature review</td>
<td>research questions or hypotheses</td>
</tr>
<tr>
<td>Why do we want to carry out the research? What do we hope to achieve?</td>
<td>formulation of objectives</td>
<td>variables</td>
</tr>
<tr>
<td>What additional data do we need to answer our research questions? How are we going to collect this information?</td>
<td>research methodology</td>
<td>type of study</td>
</tr>
<tr>
<td>How will the results be used?</td>
<td>plan for utilization and dissemination of results</td>
<td>data collection techniques</td>
</tr>
<tr>
<td>Who will do what, and when?</td>
<td>work plan</td>
<td>sampling</td>
</tr>
<tr>
<td>What resources do we need to carry out the study, and what resources do we have?</td>
<td>resources required and budget</td>
<td>plan for data collection</td>
</tr>
<tr>
<td>How will we present our proposals to authorities or potential funding sources?</td>
<td>summary of proposal</td>
<td>plan for data analysis and interpretation</td>
</tr>
</tbody>
</table>

origin; environmental contamination and degradation by animal wastes and animal products (disposal of carcasses, condemned organs, etc.); biomedical research and testing, including activities in comparative medicine (e.g. animal studies on cancer, cardiovascular disease, metabolic disorders encountered in man) and laboratory animal medicine; education and training in VPH disciplines and communication with the public; reproduction biology; aspects of mental and societal health (ownership of pets, concerns of animal welfare); and emergency veterinary functions in man-made and natural disasters (earthquakes, floods, etc.).

3.2 Objectives of HSR in VPH

The following are some major objectives of HSR in VPH:

1. assessing health needs related to animal health, and food and other animal products hygiene by measuring morbidity and mortality rates, levels of microbiological and physical contamination, and risks due to animal populations;

2. determining the conditions for and the effects of alternative patterns and strategies of animal health care contributing to human health in terms of feasibility, quality and costs;

3. elucidating the needs and availability of health resources, including manpower, establishments, equipment and supplies (including drugs), and knowledge;

4. analysing management problems, including programme planning, administration, and regulation so as to achieve greater managerial efficiency. This concerns, in particular, the identification of resources in different sectors, methods for their mobilization, inhibiting factors and methods to overcome these at the institutional, social and personal level;

5. selecting the most suitable methods of encouraging community participation (Annex 2);

6. indicating the need for intersectoral action in analysing relevant health problems and proposing solutions related to animal health, and food and other animal products hygiene;

7. analysing and developing educational approaches, both professional and public, most suitable to health care;

8. monitoring and evaluating the effects of animal health and products hygiene programmes by analysing their structure, process and outcome;

Studies should be conducted using HSR techniques to encourage and strengthen collaboration, coordination and cooperation between medical and veterinary administrations and other agencies in the prevention and control of zoonoses and foodborne diseases, and other VPH programmes;

Attention should be given also to focus and direct the actions of certain groups (e.g. professional/commercial/industrial) to promote the aims of efficient public veterinary services.

3.3 VPH framework

There are several levels and stages in programme planning, in order to organize and operate an intersectoral programme such as VPH. The process begins with wide networking with rather general terms of reference for individual institutions, proceeds to collaboration and coordination, and ends with strong operational ties and commitments in actual programme execution. VPH activities become increasingly vulnerable as the linkages become more dense and functionally essential. HSR must be applied to elucidate levels of interdependence and help to develop a solid and systematic ordering and use of resources.

The Consultation noted that a matrix for VPH resource analysis has successfully been applied in various stages of rabies control programmes in developing countries. This framework (Annex 3) may have to be adapted to the conditions of other VPH projects. Primarily it consists of two parts: firstly, the identity and qualifications of intersectoral functions at various levels of extension; and secondly, the more detailed analysis of negative (hindrances, undermining or constraining) factors. These lead to synthesis describing objectives and approaches which will overcome or avoid the effects of these negative factors.

It is important that solutions of problems are not imposed by one sector upon another, but are developed by a HSR team or by application of mutually agreed HSR procedures. This raises the question of who should carry out such intersectoral studies and when and how an HSR team should be established.

3.4 Formation of the HSR team

Sanction for an HSR undertaking should be obtained on a governmental level. The composition of the HSR team should, if possible, include someone trained in the method plus an epidemiologist to function in the data collection and statistical analyses that will be required. It is important to establish an inter-ministerial committee to oversee and guide the undertaking and who would also be responsible for obtaining action on the results. It is highly desirable to invite other major sectors involved at various levels in the particular projects to participate in the committee’s work (see, for example, the sectors involved in the zoonoses examples used in annexes 5 and 10).

4. Specific problems for HSR in intersectoral collaboration in VPH

4.1 General considerations

Health problems and their solutions can often not be realizable in the absence of effective cooperation between the human health and veterinary branches of government. Duplication of manpower, facilities, and administrative activities directed at zoonotic disease control that now occur in the respective ministries of health and agriculture in virtually every country could be minimized, or curtailed entirely, if active efforts were put forth by members of the veterinary and public health communities.

The following considerations should be kept in mind when determining whether HSR has elucidated problems and solutions for intersectoral collaboration.

Too often, zoonotic disease control programmes are sporadic in their activities with no long term identified goals or master plan. Good ideas are brought forth in original planning sessions but little information is available on the numerators and denominators within the populations at risk. Under these conditions, when the target population cannot, or has not, been defined and no plan or goal is developed, it is difficult to implement effectively a prevention or control programme.
Constraints in intersectoral collaboration

- Incomplete composition and lack of participation in planning;
- Inadequate motivation;
- Poor acceptance by the communities and people;
- Lack of respect for local cultural patterns, religions and levels of development and education of the community;
- Failure to accept differences between countries;
- Dominated by bureaucratic interests and ambitions of officers and offices;
- Economic considerations;
- Political differences;
- Not subject to a common interdisciplinary information and evaluation service;
- Implementation without proper responsibilities.

4.2 Intersectoral collaboration at community levels (see also Annex 4)

The community must feel its responsibility and the need for assistance; and programmes must be organized, operated, evaluated, and sustained by action taken at the community level. The community must be motivated for active participation rather than being a passive recipient of VPH programming. Programmes must be designed to strengthen community capabilities towards self-sufficiency.

HSR can be used as an analytic tool to determine whether health programmes have been imposed on communities and are seen by community members as irrelevant, unachievable, and based on an outsiders' view. Since HSR and intersectoral cooperation is a relatively new and complex subject area, the various factors and conditions to be considered are described in Annex 5.

4.3 Intersectoral Collaboration at the Provincial, National and International Levels (see Annex 5)

An intent of HSR in VPH should be to identify problems and to improve conditions, from pastoral grazing through small holder farming to intensified animal production, including urban areas, or even among varying areas within particular countries or from country to country.

Since the early 1950's, VPH units have been established within ministries of health in many developed and developing countries of the world. Traditionally, emphasis on the zoonoses has been directed at programmes for prevention, control, and eradication of various zoonotic diseases. In some instances, notably rabies in developed countries, VPH units have been quite successful. However, similar success has not been achieved with many, if not most, zoonotic diseases, especially those that are enzootic in a community. Often the cause of the apparent lack of successes is the failure of intersectoral collaboration.

At governmental level systems research has to ensure that control measures are adjusted to epidemiological, economic and social conditions and that resources and mechanisms for their mobilization are identified. HSR is used to predict, record, assess and overcome events and conditions inhibiting resource mobilization. These are often due to incomplete planning, changing epidemiological conditions, personal attitudes and reactions, budgetary disbalance and inadequate management procedures at governmental level.
5. Specific examples of application of HSR in Veterinary Public Health by WHO

5.1 Rabies

1. Introduction

According to the FAO-OIE-WHO Animal Health Yearbook 1988, 108 out of 156 countries and territories are still infected by reservoirs of rabies in the dog population. Almost without exception this concerns developing countries. An estimated 2.7 billion population is living in these infected areas and there is a calculated need of 5.4 million people to be treated annually after rabies exposure. Rabies can be eliminated from its canine reservoir, but this would require concerted application of preventive measures involving various sectors and multiplicity of resources.

Experience from national and local programmes of dog rabies control has shown that regulatory measures alone are generally insufficient to bring the disease under control in modern societies. WHO has therefore developed a comprehensive technical guide for local and national programme implementation. The WHO Expert Committee on Rabies supplemented this guide by managerial tools and procedures. As a joint venture, the World Society for the Protection of Animals and the World Health Organization are preparing a specific guide on dog population management. The economic analysis of human and animal vaccine provision and delivery is basic to strategy selection. WHO gives guidance for such an analysis and for strategy selection. Appropriate human postexposure treatment may become 2-3 times more expensive than the elimination of the disease from its canine reservoir.

Being part of HSR, particular emphasis has been placed in recent years on community participation and specific guidelines have been issued by WHO and will be further developed for this purpose.

The above referenced documents provide sufficient information for technical and managerial activities, as well as for research on ecological, epidemiological and procedural (operational) aspects. This complex of intersectoral approaches in dog rabies control needs, however, basic information on the health systems involved, in particular resources and potentials of community participation, taking into consideration the attitude of individuals towards disease and control measures.


2. Objectives and procedures of health systems research in rabies control

Annex 6 shows the overall goal, objectives and sub-objectives of HSR in relation to rabies control. The scope of this research can be modified according to the prevailing conditions or the predominating problems. Emphasis should generally be placed on all aspects of community participation, but particularly on the possible contribution of the individual citizen and on the structural and human factors in the intersectoral resource mobilization. This is reflected in case studies carried out in an HSR study in Nepal and case studies carried out in Nigeria.

The consultation suggested that in addition a framework be developed for health systems research in VPH (see Annex 3). This framework may form the basis of workshops at various levels aimed at making preliminary structural analyses of the intersectoral factors in VPH. It is not to be considered as encompassing all situations.

Annex 7 shows the factors inhibiting programme management in rabies control. As shown in the preceding chapters, many resources of manpower and facilities can be identified in a country. Most important is the population's potential for cooperation. How can this potential be mobilized in conjunction with all other programme resources of services, administration and policy-making bodies? Why is resource mobilization so difficult? Only a few major obstacles are mentioned in the following.

Annex 8 shows the inhibiting factors in programme technology, particularly in quantitative aspects of disease (e.g. rabies).

Annex 9 shows the overall strategies and mechanisms to overcome inhibiting factors in relation to zoonoses control in general and rabies control in particular.

HSR can help to locate weaknesses, to give early warning of threatening inhibiting factors, and provide guidance for measures to overcome such adverse conditions. HSR may propose alternative approaches and the introduction of new technologies.

Unforeseen inhibiting factors often arise over a period of time. Interests and priority problems change and personnel is subject to turnover. HSR becomes an adjunct of long-term programmes of zoonoses control. It may ensure the balance between input into programme components of short and long-term objectives, the one often calling for transient financial obligations, the other for increasing and permanent input into infrastructural development. Eventually it is the political will, the technical capability and public awareness which must be maintained or even increased as part of programme development. Intersectoral services of HSR can be of greatest significance in the maintenance of the efforts toward the strategies specified above.
5.2 Salmonellosis

While much is known technically about salmonellosis, prevention and control of this group of infections has proved difficult.¹ ² ³ Thus in determining the possibilities of HSR for insight into prevention and control of salmonellosis in people and animals, modifications of the approach used for rabies are indicated. This is because salmonellosis cycles of infection covering agriculture, trade, commerce and environment are much more complicated than in rabies, not to speak of the multiplicity of strains of microorganisms and characteristics of infections encountered in salmonellosis.

To achieve any degree of success in salmonellosis control, agricultural and public health services must collaborate at all levels - international, national and local - which in turn involves a large number of sectors. An example of one segment of the problem is given in Annex 10, which attempts to identify the principal components in the salmonellosis cycle, and sources of contamination and critical control points in poultry husbandry with particular reference to *S. enteritidis* which has given much trouble in recent years because of egg-transmitted infections to the human population.⁴

Much research has already been carried out on the organism itself, its ecology, mode of transmission, etc. Numerous international conferences and meetings have been convened on the subject. Detailed guidelines on procedures to prevent and control the disease have been made available.⁴

What needs to be known now is why these steps have not had their desired effect and what needs to be done about it.

This is not due to lack of technical knowledge, but to the gap between such knowledge and its application. While this is true of many infectious diseases in general, it is even more pronounced in the case of salmonellosis. This is mainly because of its complexity; its ubiquitous distribution; the diversity in the pathways of transmission and the lack of coordination and collaboration among the large numbers and categories of persons and groups involved in effecting control programmes along the "food-chain".

To invoke HSR in its study, the problem of salmonellosis must be looked upon as a system with a set of subsystems - each of which are related to and interlinked with one another. Once this is done one needs to identify the gaps in the knowledge where HSR can be applied to give the answers.


There are many reasons why intersectoral collaboration and cooperation has not worked as well as it was hoped at the highest as well as at the lowest levels. Some of the more salient reasons are:

(i) it was traditional to have distinct boundaries, and traditions are hard to break;
(ii) the power associated with jurisdiction which is jealously guarded;
(iii) the desire among some to build pyramidal, hierarchical organizational structures so as to strengthen their own positions;
(iv) lack of trained manpower in particular disciplines with the result that these are not represented at vital points.

HSR studies should be designed to test approaches to overcome these problems. The setting up of indicators would assist in monitoring the success or otherwise of these measures.

The first step therefore would be to formulate a strategy to tackle each of these issues. This strategy can then be applied, and this is monitored to look for problems, difficulties, etc. The impact of the strategy is then measured by looking at the change in the indicators which have been identified.

Some topics for research of this type were identified by an Expert Committee on Salmonellosis Control.¹

1. The level of knowledge and willingness of farmers to feed and keep animals according to good agricultural practices.
2. The current practice and potential improvement of preparing, transporting and holding animals for slaughter.
3. The current use of hygiene procedures and potential for improvement during the slaughter of animals, including inspection and microbiological examination.
4. The prevailing conditions and desirable practice of import control of feed, animals and animal products.
5. The current practice and potential improvement of hygienic processing of animals product and wastes.
6. The potential of community structures, including civic groups for the mobilization of resources related to the above items.
7. The availability of governmental services and their potential for intersectoral cooperation concerning the above items.

Other questions to be studied can be similarly identified:

a) Systems designed to reduce spread internationally through animals/feeds/animal products;
b) The value of microbiological testing of final products, and regulations which demand this and its certification;
c) Why so many people prefer eating raw or mildly processed food, despite the fact that they know the danger of becoming ill;
d) Different patterns of organization and management are in existence in various countries, so far as food hygiene control is concerned. They should be investigated from the point of effectiveness and their impact with respect to the control of salmonellosis.

5.3 Brucellosis

This disease of man (undulant fever) and animals is caused by the Brucella group of microorganisms that easily cross species barriers by contact with infected tissues and the consumption of inadequately processed food (mainly milk and milk products).\(^1\), \(^2\)

Both health and veterinary departments should be involved in its control but often the lack of cooperation between these sectors seriously impedes control efforts. Health departments focus their efforts on the clinical disease in man, often not recognizing that chronic, debilitating and unrecognized infection in people exact a great toll in physical misery and loss of work capacity.

In the agricultural sector, veterinary departments concentrate on control of abortion in cows, but frequently ignore the importance of control efforts in infected sheep and goats, the most important reservoirs of human disease in many developing countries, because of their lower economic value than infected bovines and swine.

Thus an HSR approach can be very helpful in spotting the weak points in control efforts and in concentrating on the critical sectors necessary for success.

The following items will be of concern in the infection chain and control efforts, and will help to identify the sectors involved and the status of intersectoral collaboration:

- hospitals and health clinics;
- sheep, goats, cattle, water buffalo and swine as sources for human infection through ingestion or by direct contact;
- processing of milk and milk products (especially cheese), and meat;
- occupational risks (abattoir workers, veterinarians, farmers);
- diagnostic and vaccine producing laboratories and control of biologicals;
- control strategies and legislation at local and national levels;
- health and veterinary administrations at national and local levels;
- statistical services (human and veterinary morbidity and mortality);
- food habits, social customs, types of animal husbandry;
- education of consumer groups, agricultural cooperatives, and farmers and their families.

6. HSR and Veterinary Education

6.1 The impact of HSR on veterinary education

Since HSR investigates resources and their mobilization in VPH programmes, it is obvious that a large proportion of the findings of HSR concern lack of knowledge and training. Technical and managerial components of VPH can only be improved by appropriate education and training. This education ranges from undergraduate training of the veterinary and other disciplines through specialized postgraduate training, to continuing education of all those responsible for the coordination and execution of VPH activities. The education of the community as a whole must not be neglected.

HSR should be employed to identify problem areas and used as the basis for proposed education and training objectives for all the groups mentioned above. Apart from specific technical functions in laboratory diagnosis, vaccine production, disease surveillance, animal ecology and vaccinology, HSR may be used to elucidate distinct areas which have been neglected and to call for increasing efforts.

The Consultation agreed with the results of an earlier meeting on veterinary education that currently applied curricula do not reflect the trends towards population medicine. More emphasis should be placed on preparing students for epidemiological foresight, preventive measures based on the active cooperation of community members, and for managerial functions in programme planning and execution. An approach to adapt veterinary education including epidemiology to social needs was described by Dr Schwabe.

HSR can provide a critical analysis and effective design of undergraduate and postgraduate education in veterinary and medical related disciplines.

6.2 Teaching of HSR

The group saw a great need for the training of specialists in HSR. Nearly all those engaged in public veterinary medicine and many managers in science and industries will profit from this managerial and technical tool.

This field is, however, not yet taught in the majority of countries. The Consultation considered this to be a very unsatisfactory situation and urges professional associations, international organizations and veterinary schools to determine the scope of HSR in their areas of interest.

In education and training, HSR may be considered as a component of epidemiology. The definition, approaches and objectives of epidemiology are to a large extent intertwined with HSR. HSR adds research on resources and their mobilization to epidemiology, thus enhancing disease control.

In view of the complementarity of HSR and epidemiology, training in either of these fields will challenge educators and students to study both in an integrated fashion. This should be reflected by curricula for undergraduate education, and should become basic for postgraduate and particularly continuing (in-service) training.

An example for such training in the USA services is given in Annex 11.

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7. **Recommendations**

The Consultation recognizes that intersectoral collaboration is not only a desirable, but essential component to the success of VPH programmes. The Consultation recommends that member states should apply HSR methodology as a key to the practical implementation of cooperation between veterinary and human health services and as a managerial tool for a more effective mobilization of often scarce national and local resources for VPH activities.

1. WHO, through its zoonoses centres and WHO collaborating centres, should encourage training on the application of HSR in VPH subjects; this should be initiated through pilot courses.

2. Communities embarking on VPH programmes should be made aware of concepts and methods of HSR to ensure their full application in solving problems at the local level.

3. In view of the unsuccessful efforts so far to control many of the zoonoses and food-borne diseases, urgent efforts should be made, through the HSR concept, to conduct studies designed at solving the gaps between technical knowledge and its application. An appropriate institute should be designated by WHO to initiate this process.

4. All WHO expert committees dealing with specific zoonoses, food hygiene and other VPH problems should consider the inclusion of the role of HSR in their discussions wherever appropriate.

5. Above and beyond official VPH programmes, the Consultation recommends that HSR be used to facilitate implementation of additional possibilities for veterinary and human health collaboration in the sharing of expensive and often scarce resources, such as: diagnostic laboratories, cold-chains, as well as transportation and training of personnel for mutual benefit.

6. Recognizing that it is often much easier to implement formal and informal intersectoral collaboration at community level, the Consultation recommends that greater encouragement and flexibility be accorded local authorities in the practical implementation of collaborative VPH programmes. Moreover, the Consultation recommends that such local initiatives should serve as a source of inspiration for innovative formulation of wider levels of policy.

7. In-service training, which should be a continuous process, should be expanded with a focus on epidemiology, intersectoral collaboration and community participation to encourage the use of HSR in the solving of problems.

8. To facilitate HSR, postgraduate education curricula in relevant veterinary disciplines should integrate specialities such as management, economics, finance, administration, social sciences and communication.

9. HSR should be applied in connection with epidemiology and animal health management to adapt curricula of veterinary training to the particular needs of a country.
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STRUCTURING EDUCATION FOR COMMUNITY PARTICIPATION IN VETERINARY
PUBLIC HEALTH PROGRAMMES - AN OBJECTIVE OF HSR

Members of the community need information, motivation and mobilization in order to become active participants in local VPH programmes. HSR provides scientific tools for the input and approaches. When planning and implementing HSR, the following conditions and requirements should be taken into consideration.

- Every communication with the community must be in the local idiom, regardless of the status of an outside language as "official". The hardest-to-reach members of a community tend to be the ones least likely to read and speak another language. All educational materials and messages should be in the local dialect, and all educators must be fluent in it. Encouraging community participation in communication message development and in the preparation of information and educational materials, ensures the linguistic and cultural appropriateness, and the effectiveness, of the materials.

- Locally recruited and trained educators and communicators will constitute a group of informed citizens equipped for leadership roles in other aspects of the VPH campaign.

- Informational education programmes are sustained campaigns designed to raise public awareness by broadly disseminating general information about a disease and its control. The most effective methods of increasing the level of community knowledge involve face-to-face informational meetings with community leaders, health workers, civic groups, teachers and school children. Prepared training modules for informational meetings allow semi or unskilled personnel to become effective presenters, and they ensure the maintenance of the quality and accuracy of the information given out.

- For area control, information regularly broadcast through mass media channels may supplement face-to-face informational meetings with the public. Radio and newspapers are usually more cost-effective than television in developing nations. Since radio audiences tend to include several communities, this medium is generally unsuitable for specific information targeted to a particular community.

- Community motivation is achieved by involving the community in the collection and dissemination of research findings, and in participation in planning based on these findings. Widespread understanding of a VPH problem in its unique local context and discussion of the problem and its planned intervention precipitate motivation. Preliminary research carried out at the block level can be a powerful learning experience for the community. Once the implications of the findings are understood, and the formulation of a neighbourhood plan of action has begun, the level of motivation will be raised.

- Mobilization programmes provide specific information on which an informed and motivated community can take action in a VPH campaign. Mobilization messages will announce the campaign, describe the actions to be taken, and will include specific information on dates and places. Banners and posters in the local languages are effective written means of announcing a campaign and identifying the location of mobile clinics, and so on. Loudspeaker vans and loudhailers are the most effective means of immediate mobilization - especially to illiterate or otherwise communicationally-marginalized community members. Operators should be recruited in each neighbourhood in order to be responsive to local variations in culture and language.
ANNEX 3

SUGGESTED FRAMEWORK FOR HEALTH SYSTEMS RESEARCH FOR VETERINARY PUBLIC HEALTH

Though temporal in concept, the framework is dynamic in practice (Table A) as all topics and levels may be active simultaneously. Four major topics of analysis are presented on the ordinate (left) of the framework for each level of analysis: (1) disease intelligence; (2) existing infrastructural components; (3) strategy; and (4) intra and intersectoral considerations. Subtopics are also presented. Within each of these major topic areas are the actual critical points to which HSR may be applied. On the abscissa (top of page), critical points may be evaluated, analyzed, and acted upon at the same time through intersectoral cooperation, coordination, and collaboration at any one, or more than one, of the 5 levels, e.g. community, intercommunity, provincial, national, or international (WHO). Although HSR can be applied at any level of the framework at any time, it may be most effective, when analysing the formal structures, to apply HSR initially at the level where most of the process of decision-making occurs.

Critical point analysis is presented in a positive, negative and synthesis format analysis (see use of Tables B and C). Positive (support) analysis illustrates activities that are present/not present and which will assist in the goals or objectives of the HSR activity. Negative (constraint) analysis illustrates critical factors which if present will inhibit the objectives. Synthesis is an application in which a negative factor is corrected so that implementation can, or will, occur. An example of this framework as applied to rabies control in Nigeria is found in Tables B, C and D.

The application of this resource analysis framework should be based on an organogram showing for all sectors interested and potentially involved the major lines of communication (coordination and reporting). Table D shows such a scheme for rabies control in a country of federal structure. Taking rabies surveillance as an example, HSR may be crucial for the planning and management of an adequate system. For example, the diagnostic centres at state level as well as the Central Veterinary Laboratory are part of the Ministry of Science and Technology. It is therefore difficult to integrate in their functions and mechanisms, which largely depend on case notification and specimen collection from two to three other ministries, e.g. Ministry of Agriculture, Ministry of Health, Ministry of Internal Affairs, which all have their own lines of communication from the community to the central government, but separately from the laboratory service. Tables B and C include examples applying "Force field analysis" identifying approaches, overcoming constraints and helping the sectors to strengthen their collaboration.

The analysis in Table D at national and state level, and at local level, shows that these two parallel structures seldom have points of contact (mostly restricted to emergency situations). Moreover, the different sectors of the former structure (MOH, MOA, MOE, etc) have little occasion for intersectoral dialogue or for influencing local councils because of the usual vertical top-down flow of commands. On the other hand, local traditional institutions have more intense relationships with the community, the private sector and the local governmental council. Some positive and negative factors related to the two structures are shown by force field analysis in Table B and C, as well as some possible solutions to improve intersectoral collaboration and thus programme efficiency.
### TABLE A

**VETERINARY HEALTH SYSTEMS RESEARCH AND DEVELOPMENT FRAMEWORK**

<table>
<thead>
<tr>
<th>Topic of Analysis</th>
<th>Community</th>
<th>Intercommunity</th>
<th>Provincial</th>
<th>National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Disease</td>
<td>Pos Neg Syn</td>
<td>Pos Neg Syn</td>
<td>Pos Neg Syn</td>
<td>Pos Neg Syn</td>
<td>Pos Neg Syn</td>
</tr>
<tr>
<td>Intelligence:</td>
<td>Problem Identification/Prioritization Surveillance Baseline data collect. and processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Existing</td>
<td>Infrastructural components Resource Identification Organization Framework Formal/Informal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy</td>
<td>Goals/ Objectives Policies Resource commitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Inter- and</td>
<td>and Intrasectoral considerations Networking Cooperation Coordination Collaboration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE B

VETERINARY HEALTH SYSTEMS RESEARCH AND DEVELOPMENT

Force Field Analysis

**Topic of Analysis:** Organization framework (informal)

**Level of Analysis:** (Circle): Comm/Intercomm/Prov/Nat/WHO

**POSITIVE FACTORS** (enabling, supporting)

- Informal authorities can quickly mobilize resources (including human resources)
- They can mobilize different sectors of the society
- They know the best way to send the message to the community

**NEGATIVE FACTORS** (hindering)

- Penetration differs from area to area
- Decisions are in the hands of a few leaders which could be influenced by local interests

**SYNTHESIS** (supporting objectives)

- Increase community participation
**TABLE C**

**VETERINARY HEALTH SYSTEMS RESEARCH AND DEVELOPMENT**

**Force Field Analysis**

**Topic of Analysis:** Organizational Framework (Formal)

**Level of Analysis (Circle):** Comm/Intercomm/Prov/Nat/WHO

**POSITIVE FACTORS** (enabling, supporting)

- Decisions are taken at national levels and thus increase the likelihood of implementation at the provincial level.

- There is veterinary representation in different structures, thus it is easier to collect information and to build a common perspective of the disease across sectors.

- Decision information flows rapidly from national to regional and community levels.

**NEGATIVE FACTORS** (hindering)

- There are no national or state steering committees

- Possible duplication of activities

- Possible development of territorial interests

- Relationship and activities with the informal framework only in case of emergency

**SYNTHESIS** (supporting objectives)

- Form steering committees

- Coordination

- Collaboration

- Stable relationship with informal leaders through the community
## Annex 3

### TABLE D

**SECTORS INVOLVED IN RABIES CONTROL IN NIGERIA**

<table>
<thead>
<tr>
<th>MOH</th>
<th>MOE</th>
<th>MOA</th>
<th>MOJ</th>
<th>MOIA</th>
<th>MOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry</td>
<td>Ministry</td>
<td>Ministry</td>
<td>Ministry</td>
<td>Ministry</td>
<td>Ministry</td>
</tr>
<tr>
<td>of</td>
<td>of</td>
<td>of</td>
<td>of</td>
<td>of</td>
<td>of</td>
</tr>
<tr>
<td>Health</td>
<td>Education</td>
<td>Agriculture</td>
<td>Justice</td>
<td>Internal</td>
<td>National</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Affairs</td>
<td>Laboratory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State Health Services and Hospitals Offices</th>
<th>University and Veterinary Divisions</th>
<th>Legislation</th>
<th>Police Customs Immigration</th>
<th>State Vet. Investig. Centres</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PHC Centres</th>
<th>Secondary Schools</th>
<th>Veterinary Services</th>
<th>Courts</th>
<th>Police</th>
<th>Local Vet. Investig. Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Offices and Hospitals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resources at local level include public services as specified above, traditional institution (e.g. healers) and the private sector proper. The local government council assists in coordination and resource mobilization.
Community Participation

The sustainability of a VHFP programme is frequently undermined by over-reliance on outside resources. The fewer the external inputs, the more the community can own the programme and the more likely it will continue under local volition. Fewer external inputs at the outset will increase the chances that the programme will be sustained without external funding. HSR can elucidate the extent to which the community is able and willing to participate in a health programme, and which resources should be provided by inter-community cooperation or by the civil services and higher administration levels. Essential inputs in the form of vaccines, syringes, medicines, and other equipment and supplies may have to be subsidized so that the community can be ensured of a regular and adequate supply. From the planning stages, HSR should find solutions to ensure sustainability of the programme.

The diversity of social and ecological variation exhibited at the local level is too often ignored by adherence to overly prescriptive programme guidelines. Until quite recently this has been true of rabies control programmes in developing countries that were modelled on control strategies tailored to highly regimented industrial societies.

HSR must evaluate the impact of VHFP programmes on the wellbeing of the community rather than on the quantity of services extended. Periodic evaluation should be made from the perspective of the recipients. The participation of community members in planning and evaluation appears essential in this function of HSR.

However attractive the coopertion of influential community groups and individuals into local government health delivery systems may appear in the short-term, HSR should be employed as a means to securing long-term collaboration between public health authorities and elements of the community. HSR will reveal the potentially deleterious effects and inherently short life of coopertion that conflicts with and may subvert community structures; and it will discover the mutual veterinary public health interests of community and government that will bind a healthy, long-term collaboration. A community may be willing to have parts of its structure and function "taken over" by outsiders in an emergency, but the long-term relationships demanded by VHFP programme surveillance and maintenance can only be fostered by collaboration and community participation.

Interssectoral Collaboration in Inter-Community Levels

The effectiveness and sustainability of VHFP programmes at district level may be assured by encouraging districts and communities to work together in establishing each other's programmes, thus establishing area control through inter-community collaboration. HSR should reveal whether and how inter-community collaboration in VHFP is desirable and can be achieved.

The inter-community level may be vital in many disease control programmes concerning diagnostic services and other technical resources, e.g. technical expertise in planning and education, specialized service staff, vaccines, equipment, etc. Collaborating communities can also provide the neighbouring communities with successful models, expertise and shared resources.

Since intersectoral collaboration at the provincial level should support community VHFP activities, committees for HSR and programme coordination at provincial level should

* Prepared by Dr M. Frith, Department of Health Education, College of Health and Human Development, Pennsylvania State University, University Park, USA
Annex 4

include representatives of existing committees such as district development, health, or nutrition committees, as well as representatives of other ministries and organizations (e.g. NGO's) with responsibilities and interests in maintaining public health programmes at the community level.

HSR should be used to analyse carefully the composition and functions of such committees and the collaborating services, agencies, ministries, and associations at various levels. This may lead to unexpected cost-saving through resource sharing. Recent examples of shared diagnostic laboratories in Mexico and the Philippines, cold-chains for heat-labile vaccines, and efforts initiated under especially difficult pastoral conditions in the southern Sudan for both the Expanded Programme of Immunization (EPI) for children and rinderpest control in cattle, show how intersectoral cooperation can often be achieved at provincial and local levels.

1Rabies in the Tropics, Kuwert, Koprowski and Bögel, 1984, Springer Verlag.
INTERSECTORAL COMPONENTS AT INTERNATIONAL LEVEL

Some principal VPH functions requiring contacts with international sectors are:

- data on disease mortality and morbidity in population at risk;
- technical cooperation in comprehensive national programme planning and implementation;
- coordination of control programmes of neighbouring countries in their border areas;
- prevention of the spread of the disease by promoting national enforcement or regulations concerning the international transfer of animals;
- coordination of research;
- dissemination of information.

Technical agencies:

Food and Agriculture Organization of the United Nations (FAO)
International Office of Epizootics (OIE)
Organization of African Unity (OAU)
Organization of American States (OAS)
Organization for Economic Cooperation and Development (OECD)
World Veterinary Association (WVA)
United Nations Children's Fund (UNICEF)
United Nations Environment Programme (UNEP)

Funding agencies:

United Nations Development Programme (UNDP)
bilateral and multilateral agencies

National and commercial producers of biological products

INTERSECTURAL COMPONENTS AT NATIONAL LEVEL

<table>
<thead>
<tr>
<th>Ministries</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Welfare</td>
<td>Planning and communicable disease control, diagnostic and biologies production, morbidity and mortality statistics, legislation, regional and community affairs, outpatient clinics, hospitals, research institutions, medical training institutions.</td>
</tr>
<tr>
<td>Agriculture</td>
<td>epizootic control, diagnostic and biologies production, animal statistics, veterinary services*, forestry, legislation, manpower development, supplies and logistical support, quarantine services</td>
</tr>
<tr>
<td>Environment</td>
<td>wildlife protection</td>
</tr>
<tr>
<td>Education</td>
<td>manpower development</td>
</tr>
<tr>
<td>Interior</td>
<td>police, militia</td>
</tr>
<tr>
<td>Economy</td>
<td>finances</td>
</tr>
<tr>
<td>Defence</td>
<td>army</td>
</tr>
<tr>
<td>Commerce</td>
<td>import/export</td>
</tr>
<tr>
<td>Commerce and Rural Development</td>
<td>education, self-help organization</td>
</tr>
</tbody>
</table>

UN/International organizations: Food and Agriculture Organization of the United Nations International Office of Epizootics

NGOs: animal conservation

Bilateral and multilateral voluntary and funding organizations: Churches, groups, foundations

Trade unions and political groupings

Private sector: Medical and veterinary practitioners, biologics industry

* except in countries where veterinary services are in the Ministry of Health
INTERSECTORAL COMPONENTS AT DISTRICT (PROVINCIAL, REGIONAL) AND LOCAL (COMMUNITY) LEVELS

**District**

Corresponding sectors indicated at national level, plus any specific regional coordinating organizations

**Local (Community)**

Corresponding sectors at national and district levels, plus specific community structures for health promotion, agriculture (cooperatives), education, branches of voluntary aid societies (nutrition, housing, emergency services, etc).
OBJECTIVES OF HSR IN RABIES CONTROL*

* Prepared by K. Bogel and D. Joshi.
FACTORs INHIBITING PROGRAMME MANAGEMENT IN RABIES CONTROL

*Prepared by K. Bögel and D. Joshi.*
INHIBITING FACTORS IN TECHNICAL ASPECTS OF RABIES CONTROL

* Prepared by K. Bögel and D. Joshi.
Strategies and Mechanisms to Overcome Inhibiting Factors

- To ensure adherence to the plan
- To counteract decreasing public awareness and cooperation
- To permit acceleration of activities
- Maintain concurrent political interest
- Modify resources
- Community need and support in action
- Local rules surpass central rules
- To modify rules not applicable locally - socio anthropologically
- Try to replace or modify government regulations hindering programme
- Scrutiny in examination of programme before its political endorsement

Planning and Programme Formulation

- Formation of National Committees
- Feel joint responsibility
- Feel professional interest
- Overcome intersectoral resource identification & mobilisation
- Ensure programme evaluation
- Increase mutual respect and confidence
- Overcome inhibiting factors of programme management & technology

Mechanisms and Procedures

- Interministerial endorsement and commitment
- Cabinet level
- Political commitment
- International pressure
- Training and preparedness of professional staff
SOURCES OF CONTAMINATION IN POULTRY HUSBANDRY
WITH PARTICULAR REFERENCE TO S. ENTERITIDIS

Breeding stock *
  | Egg-laying
  | Collection of eggs
  | Sanitation on farm
  | Egg processing *
  | Hygiene storage
  | Sanitation at hatchery
  | Hatching hygiene
  | "All-in all-out"
  | disinfected house/site

Feed *
  | Vermin
  | Wild birds
  | Man
  | Insects
  | Environment
  | Transport

Brooder house

Laying farm

* Critical points for special observation
See also WHO TSR 774, 1988, pages 73-76
SALMONELLOSIS

Principal responsible ministries: health and agriculture, to deal with appropriate legislation and laboratory services. Sectors involved in the salmonella cycle below have to be identified according to the particular situation in each country.

**SALMONELLA CYCLE**

* * Critical points for special observation
Epidemiology in Postgraduate Education in Veterinary Services.

An Example Programme

Each societal issue, including education, must be viewed as individual and related points on a continuum of learning. It is time for a new contemporary, across-the-board focus to education in veterinary medicine.

In response to the dearth of a cadre of trained, skilled professionals of the U.S. Animal and Plant Health Inspection Service (APHIS) had to begin "growing" its own workforce.

All APHIS courses emphasize the new contemporary imperative - intersectoral collaboration and bridging - if an education programme is to be successful and remain viable in today's rapidly changing world. The reorganization initiated a profound change in the way APHIS does business by analysing information at a very early stage and design intervention strategies which should enable us to manage our issues better. APHIS's services, of regulatory surveillance and enforcement were not responsive to contemporary societal issues.

The era of single family farms raising individual animals is in decline. What actually exists is a stampede of modern production methods, herd health effects, a new economics of management which changes management decisions and affects animal health.

Compounding the already complex changes, agriculture is becoming increasingly internationally-oriented and globally inter-related. APHIS was leaving an era of unproductive, rigid hierarchies, adverse confrontation, and the isolation of unhealthy competition, turf battles, and nest-feathering. With this backdrop, APHIS began to develop its own education curriculum, the core of which is epidemiology.

There are three basic components, each of which provides bridges to other groups. The first element of a three-pronged approach can be described as self-instructive epidemiological education: computer-based training (CBT) and materials, booklets, and correspondence courses.

Through the use of new technologies, such as videos, tapes and computer programmes, APHIS makes self-teaching materials available for the home, thus helping to implement continued adult learning.

A second element of the fundamental components are courses developed for APHIS personnel, Basic Epidemiology and Epidemiology I, which are basic training for the general staff. These courses are taught at a conceptual level as introductions to "population thinking and theories".

The third element of basic educational components is another Epidemiology I course. Our main bridge for this curriculum is the Association of Teachers of Veterinary Public Health and Public Medicine.

Epidemiology II builds on what is learned in Epidemiology I, namely, using hand-held calculators and computers in managing and analysing data, and placing emphasis on the use of epidemiological knowledge to evaluate scientific literature.

*Prepared by Dr J. Glosser, Animal and Plant Health Inspection Service, US Department of Agriculture, Washington, USA
The second area of emphasis is Field Investigations in Epidemiology. A third field is addressed in a course on Swine Production Epidemiology and Economics. The fourth area, Risk Assessment, is critical in today's world. The fifth topic is International Animal and Plant Health Economics.

A highlight of the epidemiology programme is the symposium, an annual gathering in the Washington, D.C. area, to provide a forum for APHIS veterinarians and scientists to share the knowledge gained from their activities and to learn from other scientists.

APHIS has another ongoing educational bridge with the Centres for Disease Control where each year two APHIS veterinarians study as Epidemiological Intelligence Service (EIS) Fellows.